The shift from defined benefit pensions to 401(k) plans and the pension assets of the baby boom cohort

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The rise of 401(k) plans and the decline of defined benefit plans will have an important effect on the wealth of future retirees. Changing demographic structure also will affect the aggregate stock of retirement wealth. We project the stock of assets held in retirement plans and the average retirement saving of retirees through 2040. Our projections show large increases in wealth at retirement, especially if the returns on corporate equities are comparable with historical returns. Retirement wealth will grow, however, even if equity returns fall substantially below their historical level.

returns | saving | wealth

Over the past 30 years, there has been a fundamental change in the way Americans save for retirement. In the late 1970s, employer-provided and managed defined benefit (DB) plans were the primary means of saving for retirement in the United States. In 1980, 92% of private retirement saving contributions went to employer-based plans; 64% of these contributions were to DB plans. In recent years, more than three-quarters of private pension contributions have been to "self-directed" retirement plans, in which individual participants decide how much to contribute, how to invest plan assets, and how and when to withdraw money from the plan. The 401(k) plans, named after a section of the Internal Revenue Code, are the most popular type of self-directed private retirement plan. DB plans have remained an important form of retirement saving for federal, state, and local government employees, although, even for those workers, self-directed plans are becoming increasingly important.

The baby boom generation is now approaching retirement, and Americans are living longer after retirement. There is growing interest in understanding how changing pension structure and an aging population will affect the retirement saving of the cohorts that reach retirement in the coming decades. We examine this question by analyzing how the increase in saving through 401(k)-like plans and the reduction in saving through DB plans may change the total accumulation of retirement saving. We demonstrate that the 401(k) accumulations of current retirees are a poor guide to the potential 401(k) accumulations of future retirees, because the former have typically spent only a fraction of their working career as a 401(k) plan participant. The projections developed in this article are a key input to studying how demographic change ultimately may affect asset returns.

Results

We first present results on pension wealth at retirement, which we define as age 65, and then present results on the value of total assets in pension plans by year. Fig. 1 shows the mean present value of DB benefits at age 65 for persons attaining that age between 1982 and 2040. The upper line describes the average present value of DB benefits for persons who receive DB benefits. The lower line corresponds to mean DB benefits for all persons, including those who are not the beneficiary of a DB plan. Mean DB benefits for persons who receive benefits will be greater for cohorts retiring in the future than for cohorts retiring today, because we assume that the benefits of successive cohorts will increase at a real annual rate of 1.1%. However, the lower profile shows that the present value of DB wealth averaged across all persons will decline in the future, as fewer persons participate in DB plans. Indeed, the projections show average DB wealth peaking in 2003 at about $73,000 and falling to about $50,000 in year 2000 dollars by 2020 and to about $37,000 by 2040.

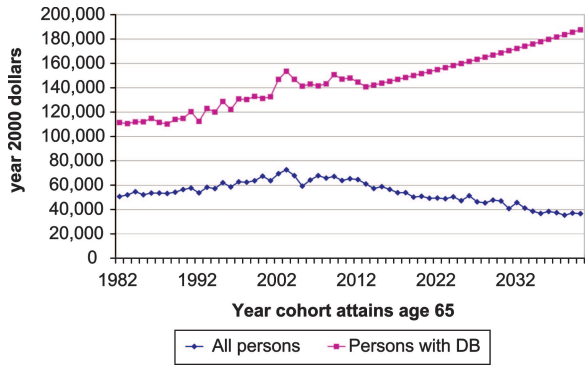

Fig. 1. Present value of DB benefits at age 65 for all persons and persons with a DB.

Fig. 2 shows the average present value of DB benefits and the average value of 401(k) assets, averaged over everyone who turns 65 in a given year, for cohorts retiring between 1982 and 2040. The figure shows two paths for 401(k) assets, one based on the historical average equity return and the other based on the assumption that future equity returns average 300 basis points less than their historical average.

Assuming that historical rates of return on stocks persist, the average value of 401(k) assets per 65-year-old equals the average present value of DB benefits per 65-year-old in 2009. Both values are roughly $67,000 in that year. Thereafter, assets in 401(k) accounts continue to grow, reaching about $137,000 in 2020, $226,000 in 2030, and $452,000 in 2040 (all in year 2000 dollars).

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Abbreviations: DB, defined benefit; GDP, gross domestic product; HRS, Health and Retirement Study; SIPP, Survey of Income and Program Participation; SSA, Social Security Administration.

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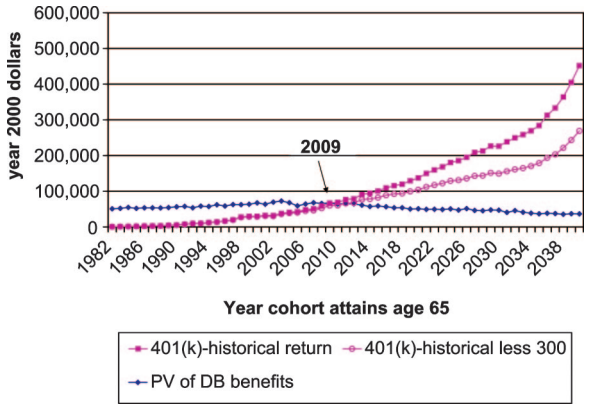

Fig. 2. Average present value (PV) of DB benefits at age 65 and 401(k) assets at age 65, average values for all persons in the labor force.

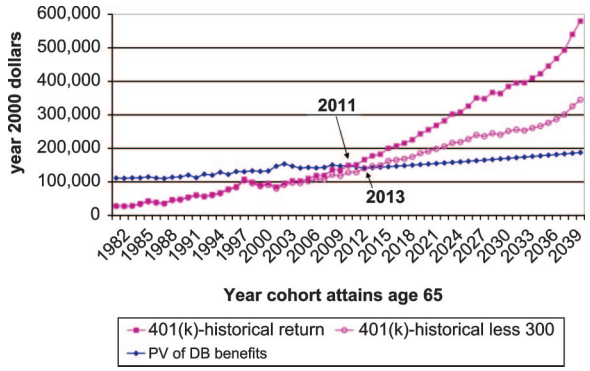

Fig. 3. Average present value (PV) of DB benefits at age 65 for persons with a DB plan and 401(k) assets at age 65 for persons with a 401(k) plan.

Projections for 2040 should be viewed with caution, because individuals in the cohort that reaches retirement age in that year were only 28 in 2003, the last year for which we have Survey of Income and Program Participation (SIPP) data that enables us to observe actual rather than forecast 401(k) saving behavior.

Other analysts, notably Holden and VanDerhei (1) and Purcell (2), also project substantial increases in future 401(k) balances at retirement. These studies, however, are less comprehensive than the analysis summarized here. They begin with a sample of current young participants and project the future assets of these workers, assuming lifetime participation. In contrast, at the heart of our projections is a demographically weighted sample of lifetime earnings histories for persons that will retire in each year between 2006 and 2040. Our study accounts for the continuing diffusion of 401(k) plans. In addition, the most important factor underlying the growth of 401(k) retirement assets for those in such plans is the greater fraction of the working career for which future retirees will be able to contribute to 401(k) plans. Almost no one reaching retirement age in the first few years of the 21st century had participated in a 401(k) plan for more than 20 years, and fewer than half had participated for more than a decade. By comparison, many future retirees in 401(k) plans will have contributed for three or four decades, and their retirement balances will reflect the power of compound accumulation on saving done early in their working careers.

Assuming that during our projection period the return on stocks is 300 basis points less than the historical rate of return, average 401(k) assets reach the average present value of DB benefits in 2010, when both are about $66,000. Assets in 401(k)s reach about $104,000 in 2020, $149,000 in 2030, and $269,000 in 2040. The lower rate of return on equities substantially reduces the accumulation of assets in 401(k) plans, but even in this case, by 2040, the accumulation of assets in 401(k) plans would be 3.7 times larger than the present value of DB benefits in 2003, the year when DB benefits per worker peak in our sample. Total assets in DB plans fall between 2003 and 2040. In 2040, the end of our projection interval, average 401(k) assets are more than seven times greater than the average present value of DB plan benefits at age 65.

Fig. 3 presents comparable information on DB and 401(k) assets at retirement for workers with each type of plan. The figure shows two paths for 401(k) assets, one based on historical equity returns and the other using historical returns reduced by 300 basis points. With historical returns, the average balance in 401(k) accounts reaches the present value of DB benefits in 2011, when both are about $148,000. Thereafter, the 401(k) assets continue to grow, reaching about $243,000 in 2020, $363,000 in 2030, and $580,000 in 2040. For persons with DB plans, the average present value of benefits also continues to grow, reaching $187,000 by 2040. By 2040, the average accumulation of 401(k) assets is roughly three times the average present value of DB benefits.

Assuming that the prospective rate of return on equities is 300 basis points lower than the historical values suggest, the average 401(k) balance of persons with 401(k) accounts reaches the present value of DB benefits for persons who receive benefits in 2013, when both are about $145,000. Thereafter, the 401(k) assets continue to grow, reaching about $185,000 in 2020, $241,000 in 2030, and $345,000 in 2040. For persons with DB plans, the average present value of benefits also continues to grow, reaching $187,000 by 2040. In 2040, the accumulation of assets in 401(k) plans for persons with such a plan is about 1.8 times the present value of DB benefits at age 65 for those with a DB plan.

Fig. 4 shows our projected values for the sum of assets in 401(k) plans and in DB plan trust funds, measured in year 2000 dollars. We scale these assets by the Social Security Administration (SSA) intermediate projection of future gross domestic product (GDP). The figure shows that pension assets have grown from nearly 50% of GDP in 1985 to roughly 90% in 2007. Our projections suggest continued growth in the ratio of pension assets to GDP, with the magnitude of this growth depending on our assumption about equity rates of return. When we assume that equities continue to deliver their historical returns, the pension assets-to-GDP ratio reaches 1.0 in 2010, 1.6 in 2030, and almost 1.8 in 2040. When we base our projections on historical returns reduced by 300 basis points, the projected ratios in both 2030 and 2040 are close to 1.2. Regardless of whether equities

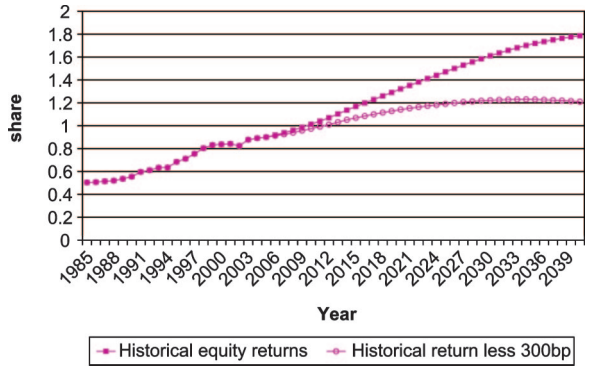

Fig. 4. Historical and projected total pension assets as share of GDP, 1985–2040, assuming that equities earn their historical rate of return and that they earn 300 basis points (bp) below their historical return.

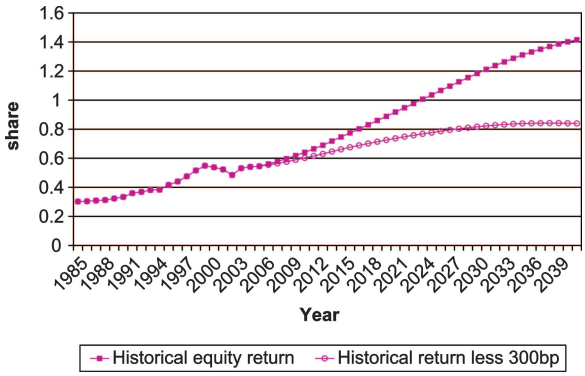

Fig. 5. Historical and projected total pension equity as share of GDP, 1985–2040, assuming that equities earn their historical rate of return and that they earn 300 basis points (bp) below their historical return.

earn 9.0% or 6.0% on average, our projections suggest a substantial increase in retirement wealth accumulation relative to GDP in the coming decades.

Because we do not assume any rebalancing between stocks and bonds in 401(k) accounts, the share of total projected 401(k) assets that are held in equities is particularly sensitive to whether we assume that equities earn their historical return or that return reduced by 300 basis points. Fig. 5 illustrates this by showing projected equity holdings in 401(k) plans and DB trust accounts as share of GDP. The upper line, which corresponds to the assumption of historical returns on equities, shows pension equity/GDP reaching 1.2 in 2030 and 1.4 in 2040, when total pension assets are projected to be 1.6 and 1.8, respectively. Thus, the ratio of pension equities to total pension assets in 2040 is just below 80%. When we assume equity returns are historical values less 300 basis points, as the lower line in Fig. 5 shows, pension equities reach 0.8 times GDP in 2030 and 2040, so pension equities are about 65% of total pension assets.

One notable conclusion from Figs. 4 and 5 is that neither pension assets as a share of GDP nor equity holdings in pension accounts as a share of GDP exhibit a sharp decline in the decades when the baby boomers reach retirement. This finding is attributable to two features of our analysis: the slow rate of decumulation of 401(k) assets for retired 401(k) participants and the substantial accumulation of 401(k) assets by cohorts that are younger than the baby boom cohort. A long working life with 401(k) coverage, a 10% of earnings contribution flow to 401(k) accounts, and the significant compound returns available on both stock and bond investments generate substantial 401(k) balances for the younger cohorts that offset 401(k) withdrawals by older workers.

Discussion

The aging of the baby boom generation, in conjunction with improvements in late-life mortality and therefore in life expectancy, has increased the average age of the U.S. population. Remaining life expectancy at age 65 increased from 14.3 years to 18.4 years between 1960 and 2003. As this demographic shift has been unfolding, the way Americans save for retirement has undergone a fundamental change. Although employer-provided DB pension plans were once the principal means of saving for retirement, the preponderance of retirement saving is now through 401(k)-like self-directed retirement plans.

We consider how demographic trends in conjunction with major changes in the structure of retirement saving will affect the future accumulation of retirement assets. We find that average wealth at retirement will increase substantially between now and 2040. Our projections suggest that the average present value of benefits from DB pension plans, averaged over all members of a cohort reaching age 65 in a given year and measured in year 2000 dollars, will decline from a peak of $72,637 in 2003 to approximately $37,000 in 2040. The present value of benefits at age 65 for workers with a DB plan, however, will increase prospectively, driven largely by projected future increases in lifetime earnings. We project that the present value of defined benefit payouts for a 65-year-old in 2040 with such a plan will be $188,000 (year 2000 dollars).

We project substantial growth in both average 401(k) balances for those with 401(k) plans and in total 401(k) wealth. Regardless of whether we assume that 401(k) assets invested in corporate stocks earn their historical rate of return or a return that averages 300 basis points below the historical return, we project that the value of 401(k) assets at retirement surpasses the present value of DB pension benefits between 2010 and 2013. This is true for the average over all persons as well as for the average for persons with DB or 401(k) plans. The projected value of 401(k) assets grows rapidly in subsequent years and substantially exceeds the projected present value of defined benefit payouts by 2030 or 2040.

Although our projections draw attention to one important source of uncertainty in future 401(k) balances, the average return on investments in corporate stock, there are other parameters that are difficult to measure and that affect our projections. One is the future path of 401(k) contribution rates. Recent legislative changes, notably the Economic Growth and Taxpayer Relief Reconciliation Act of 2001 and the Pension Protection Act of 2006, have increased the maximum allowable contributions to 401(k) plans. The latter legislation also provided firms with a safe harbor to adopt plan provisions, such as plan enrollment default provisions, which may affect participation.

These legislative changes may lead to greater 401(k) contributions in the future than in the past. Our projections assume that future 401(k) contributions as a share of salary will equal past contributions, so we may underestimate future contribution flows. Holden and VanDerhei (3) report that in 1999, 11% of participants with incomes over $40,000 contributed at the legislated maximum to their 401(k) plans. So did 13% of those with incomes between $70,000 and $80,000 and 18% of those with incomes between $80,000 and $90,000. The extent to which increases in the legal maximum contribution will increase contributions also depends on how employers react to these changes. Holden and VanDerhei (3) also report that 52% of 401(k) plan participants in 1999 were in plans in which the employer limited contributions to less than the federal maximum. With regard to other plan characteristics, Beshears, Choi, Laibson, and Madrian (4) summarize a substantial recent literature that suggests that adopting "saving friendly" defaults for enrollment, contribution rates, and asset allocation can significantly increase retirement saving through 401(k) plans. We have not built any assumption about the future impact of such provisions into our projections.

A second important source of uncertainty concerns the future evolution of 401(k) participation rates. The historical record on this issue is particularly difficult to extrapolate, because the diffusion rate in the last few years of our data sample was lower than in the earlier years. We have assumed a further slowing of the diffusion rate in our projections. The actual future path of diffusion might involve slower growth of the 401(k)-covered population if the firms that have not already adopted such plans face higher costs of doing so or if their workers are less interested in retirement saving than the workers at firms with such plans. The legislative changes described above also may affect the diffusion of these plans, however, and the most likely impact of such changes would be an increase in diffusion rates. There should be substantial new information on the diffusion of 401(k) plans in the next few years, and that may help to refine our projections.

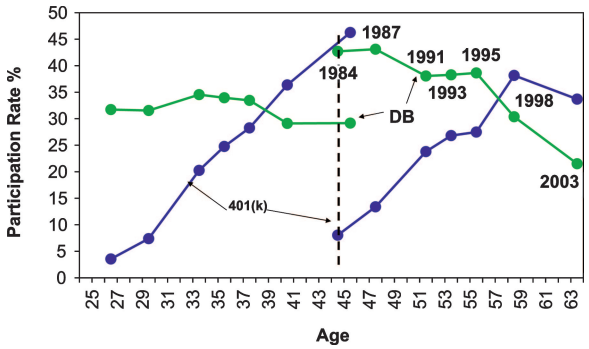

Fig. 6. DB and 401(k) participation rates of employed persons for cohorts aged 27 and 45 in 1984.

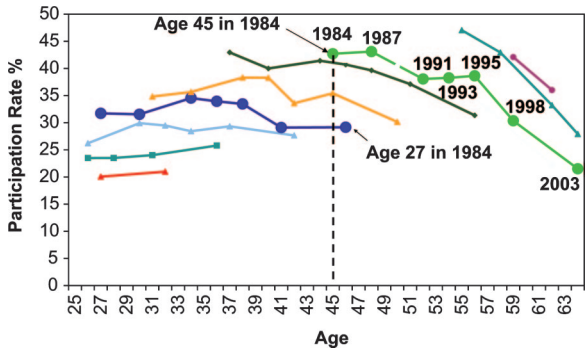

Fig. 7. DB participation rates for 1984–2003 period, employed persons in various age cohorts, identified by cohort age in 1984.

Another source of uncertainty is the date at which future workers will retire and begin to draw down their retirement assets. Most defined benefit plans provide substantial incentives for participants to leave the labor force early, often at the early retirement age. Self-directed retirement plans do not have such incentives, and their diffusion is therefore likely to prolong the stay of older workers in the labor force. Friedberg and Webb (5) show that current participants in defined benefit and 401(k) plans exhibit significant differences in retirement behavior. Longer working lives may result in larger 401(k) accumulations and a lower rate of withdrawals from these plans than we have forecast.

Our focus on the average level of 401(k) wealth at retirement and on the aggregate amount of retirement wealth accumulation is natural when considering how changing demographics and pension structure may affect the aggregate economy, but it can conceal important heterogeneity in the retirement circumstances of different households. Even though our projections suggest a rising level of future retirement wealth, we cannot conclude that all Americans will be well prepared for retirement. Personal 401(k) plans, like DB plans for earlier cohorts, are less common among low-wage workers than among their high-wage counterparts. The rate of diffusion of 401(k) plans to low-wage workers will be a key determinant of the future retirement security for this group.

Methods

Our algorithm for projecting the retirement saving of future cohorts is grounded in historical information on both the diffusion of 401(k) plans through the labor force and on the participation rate in these plans. Our analysis begins with data from the SIPP, which collects pension data for 7 survey years between 1984 and 2003. These data allow us to follow individuals in given birth cohorts over time. For example, we can follow a cohort by linking survey information on individuals who were age 27 in the 1984 survey, individuals who were 30 in the 1987 survey, individuals who were 34 in the 1991 survey, and so forth.

Fig. 6 shows the participation rates in DB and 401(k) plans for the cohorts that had attained the ages of 27 and 45 in 1984. The first data point in each profile represents the participation rate in 1984, whereas the last pertains to the participation rate in 2003. The figure shows a decline in the participation rate in DB pension plans and an increase in the participation rate in 401(k) plans. Among employed persons who were 45 years old in 1984, about 43% had a DB pension. Only 29% of those who attained age 45 in 2003 had a DB pension. In contrast, 8% of employees who attained age 45 in 1984 and 45% of those who attained age 45 in 2003 had a 401(k) plan.

Figs. 7 and 8 show DB and 401(k) participation rates for employees in many cohorts. The data underlying these figures provide the foundation for our projections of both DB and 401(k) wealth at retirement. For example, consider the 401(k) cohort data in Fig. 8. There is an upward shift in the cohort profile for each successively younger cohort. To predict participation rates for cohorts younger than those represented in the SIPP data, we extrapolate the trend in these "cohort effects." Simple extrapolation of the 1984 to 2003 trend to younger cohorts would, in some cases, lead to predicted 401(k) participation rates in excess of 100%. We therefore adopt an alternative extrapolation procedure, which we describe in detail in ref. 6, that assumes that 401(k) plans will continue to diffuse through the workforce, but at a declining rate.

Projecting Future DB Benefits of Beneficiaries. DB benefits for persons of a given age in a given cohort depend on the probability that benefits are received and on the dollar amount of benefits, given that benefits are received. We estimate the value of benefits conditional on receipt by estimating cohort effects based on SIPP data for persons 55 and older and then by using these cohort effects to predict the dollar amount of benefits for younger cohorts. The predicted dollar amount of benefits received per recipient rises as we consider successively younger cohorts.

To predict the dollar amount of benefits for the youngest cohorts, we supplement our cohort effect projections with forecasts of average wage growth as reported by the SSA. Estimated cohort effects and the SSA wage index are highly correlated over the sample period for which we have SIPP data. We assume that the annual growth rate in the value of DB benefits, conditional on receipt, will be 3.9% per year, the SSA intermediate growth rate assumption for the wage index.

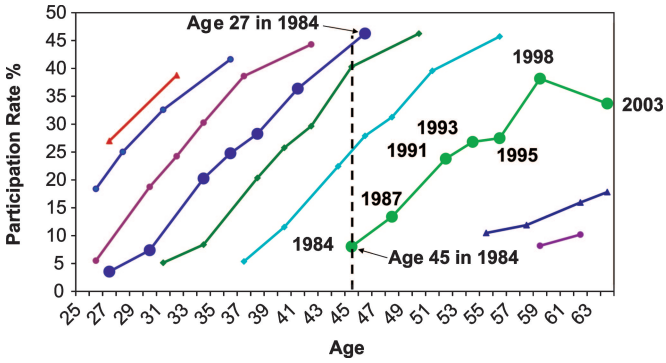

Fig. 8. The 401(k) participation rate of employed persons 1984–2003, employed persons in various age cohorts, identified by cohort age in 1984.

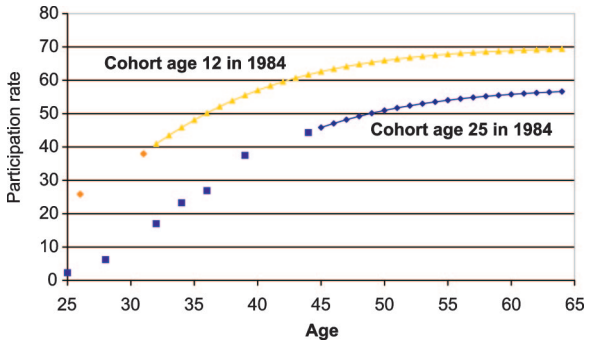

Fig. 9. Actual and projected participation rates for cohorts aged 12 and 25 in 1984.

Future Recipients of DB Benefits. We follow a similar procedure to predict the future proportion of persons who will receive DB benefits. We begin with SIPP data on the proportion of persons 55 and older that receives DB benefits, estimate cohort effects, and use them to project participation rates for younger cohorts. These estimated cohort effects, however, are not sufficient to predict benefit receipt for the youngest cohorts, so we also rely on information in SIPP about their DB plan participation rates. We describe this procedure in greater detail in ref. 7.

Present Value of DB Benefits at Age 65. We project the average present value of benefits at age 65 for persons who receive DB benefits by forecasting the average value of age-specific DB benefits for persons at all ages up to 100 and then by discounting those future payouts. We use demographic data to calculate the probability that a person who receives a DB pension will live to receive benefits at each age up to 100. By summing the discounted value of the benefit at each age times the probability that the person will be alive to receive the benefit, we obtain the expected present value of benefits at age 65 for those who receive DB benefits in each cohort. We obtain the average present value of benefits at 65 for all persons in the same way, except that in this case we multiply the dollar amount of benefits for recipients by the probability that a person at a given age in a given cohort receives benefits.

Participation in 401(k) Plans. Our projections of future 401(k) participation also begin with SIPP cohort data like that shown in Fig. 8. These data suggest that, for most cohorts, the within-cohort increase in 401(k) participation rates was smaller between 1998 and 2003 than in earlier intervals of comparable length. In addition, the upward shift in the cohort effects between cohorts seems to be smaller for younger than for older cohorts.

In light of the apparent compression in the cohort effects and the apparent decline in the rate of increase in within-cohort participation rates, we assume that the future rate of within-cohort increase in 401(k) participation rates will be lower than the historical rate of increase. Fig. 9 illustrates the effect of this assumption. It displays projected future 401(k) participation rates for two cohorts: the one that was 25 years old and the one that was 12 years old in 1984. Those cohorts reach age 65 in 2024 and 2037, respectively. Fig. 9 also shows the actual participation rates for these cohorts in 2003 and earlier years. For the cohort that was 25 in 1984, simple extrapolation of the SIPP cohort data would yield a 401(k) participation rate of nearly 70% at age 65. Our restricted-growth projection procedure yields a participation rate of 57%. Simple extrapolation for the cohort that was age 12 in 1984 would yield a participation rate over 100% by age 65. The restricted growth projection for this cohort (age 65 in 2037) is just under 70%. To make the participation rates more realistic, we adjust our projected future 401(k) rate for each person in the 2003 SIPP to recognize variation across earnings deciles in 401(k) participation rates while preserving our cohort-specific predicted average participation rates.

Contributions to 401(k) Plans and Earnings Histories. Estimating 401(k) contributions requires projecting the lifetime earnings trajectory of individuals in future retirement cohorts. We do this using the Social Security earnings histories of respondents to the Health and Retirement Study (HRS) who attained age 65 in 1998, 1999, and 2000. We convert earnings in all earlier years to year 2000 dollars and then treat these constant-dollar earnings histories as a random sample of the earnings histories of the cohort that attained age 65 in 2000. To make projections for the earnings of workers in cohorts that had not reached aged 65 by 2000, we inflate each earnings history in the sample using the 3.9% annual earnings growth rate from the SSA intermediate assumptions. Similarly, to project earnings for cohorts that were older than age 65 in 2000, we deflate the earnings of the "65 in 2000" cohort using the Social Security average wage index. We generate separate wage trajectories for married men, single men, married women, and single women.

The SSA earnings histories include years with zero earnings, so our procedure implicitly assumes that the employment rate and the distribution of employment by age is the same for future cohorts as for past ones. We assume the future marital status proportions at age 65 will be the same as those in 2000. Our procedure implicitly assumes that the distribution of wage income does not change in the next few decades.

In addition to wage histories, we also need several other inputs to project the future accumulation of 401(k) assets. Our assumption about the fraction of earnings that employees and firms contribute to these plans is a key parameter. We set it at 10% in the projections reported below. This is consistent with a range of different data sources. In ref. 8, we compute a combined employer and employee contribution share of near 10% using the Current Population Survey, and tabulations from the 2003 SIPP support this. Holden and VanDerhei (3) present estimates based on the Employee Benefit Research Institute database of 401(k) plan participants. Engelhardt and Cunningham (9) report an average employee 401(k) contribution rate of 6.6% in 1991 from the HRS. Form 5500 filings show that employee contributions represent about 68% of total 401(k) contributions, so the HRS data also seem consistent with roughly a 10% combined contribution rate.

Although we do not report any projection results using a lower combined employer and employee contribution rate, it is not difficult to gauge the impact of reducing this rate. Our projections for the distant years, such as 2040, are close to proportional to our assumed contribution rate. Using this rule of thumb, readers who disagree with our assumed contribution rate can revise our projections accordingly.

We assume that 40% of 401(k) contributions are invested in bonds and that the other 60% is invested in large-capitalization stocks. Our hypothetical 401(k) participants do not rebalance their portfolios, so that if the return on stocks exceeds that on bonds, the equity share in 401(k) accounts will be substantially greater than the 60–40 allocation of new contributions.

We consider two scenarios with respect to the future returns on stocks and bonds. In the first case, we assume that historical average rates of return persist. Ibbotson Associates (10) indicates average arithmetic real returns between 1926 and 2005 of 3.1% for long-term corporate bonds and 9.2% for large company stocks. We use a rate of 3.0% for bonds and 9.0% for stocks. The equity return may understate the return available to investors, because it does not consider small stocks, which had a higher return, 14.3%, over the historical period. The second scenario we

consider reduces the return on stocks to 300 basis points below the historical average.

We assume that annual withdrawals from 401(k) plans are 2% of balances between ages 65 and 70½, and a fraction equal to the reciprocal of remaining life expectancy times the 401(k) balance at older ages. We also account for "leakage" or "cash-outs" from 401(k) retirement saving. The probability that a 401(k) accumulation is cashed out equals the employee job-separation rate, times the probability that the employee takes a lump-sum distribution, times the probability that a lump-sum distribution is cashed out rather than rolled over. We calculate the first two of these probabilities from SIPP and the last from the HRS.

Assets in DB Trust Funds and Assets in 401(k) Plans. To project the total value of assets held in both DB and 401(k) plans in future years, we multiply our estimates of 401(k) and DB plan assets for individuals in each cohort-year by the SSA's projections of the number of individuals in each gender–marital status category in future years. The foregoing discussion explains how we project future 401(k) assets per person by age and year. We follow a similar procedure to obtain total assets in DB plan trust funds in each year. Our algorithm forecasts average DB benefits by age within cohorts. We then multiply the number of individuals in various categories in future years by the average DB benefits for individuals in each category to obtain a projection of future DB benefits. We combine such projections of future DB benefit payouts with an assumption that DB plans are fully funded, so that the value of DB plan assets equals the present value of future DB payouts. This yields our estimate of the projected value of DB plan assets.

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